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Kanai et al.

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[54] **METHOD OF FABRICATING SECONDARY ELECTRON EMISSION PREVENTIVE FILM AND COLOUR PICTURE TUBE HAVING SAME**

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[52] **U.S. Cl.** **427/68**; 313/466

[51] **Int. Cl.**[2] **B44D 1/02**

[58] **Field of Search**.. 313/68 A, 69 C, 92 R, 92 PD, 313/92 PH; 117/33.5 CM, 33.5 CP

[56] **References Cited**

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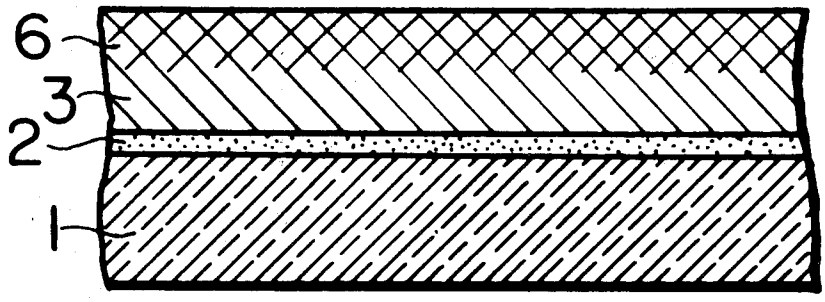
[57] **ABSTRACT**

A method of fabricating a secondary electron emission preventive film for use in a colour picture tube comprising the steps of applying a fluorescent screen on a face plate, forming a deposited layer as a metal back layer on the fluorescent screen, spraying an aqueous suspension of either carbon or boron particles on the metal back layer and heating the face plate to form a mixed layer of either the carbon or boron particles and the metal back layer on an upper portion of the metal back layer, and the improvement of a colour picture tube having the secondary electron preventive film fabricated by the method.

3 Claims, 5 Drawing Figures



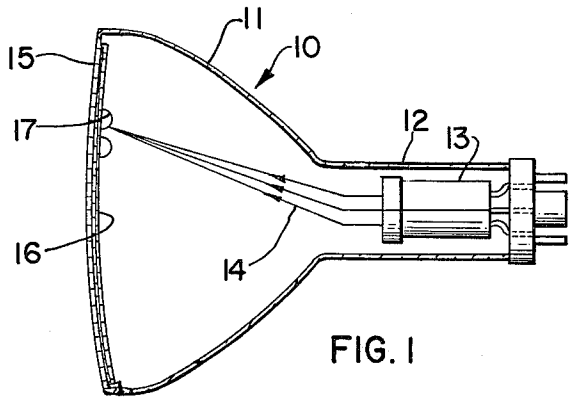


FIG. 1

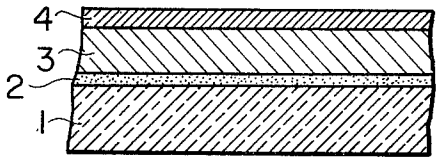


FIG. 2
PRIOR ART

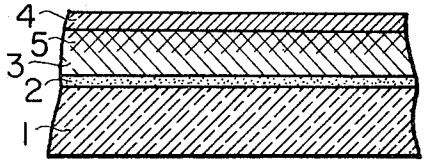


FIG. 3
PRIOR ART

FIG. 4

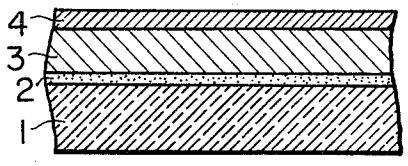
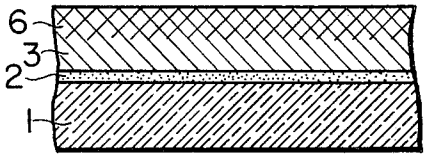


FIG. 5



METHOD OF FABRICATING SECONDARY ELECTRON EMISSION PREVENTIVE FILM AND COLOUR PICTURE TUBE HAVING SAME

This invention relates to a colour picture tube and more particulary to a secondary electron preventive film for suppressing the emission of the secondary electron from a metal back layer on a face plate in order to improve the colour purity of an image and the contrast thereof in a colour picture tube.

It is well known that the colour picture tube, in general, consists of a neck part including an electron gun, a funnel part one terminal of which is connected with this neck part, a face plate which is connected with the other terminal of the funnel part and is deposited with a fluorescent screen on the inner surface thereof and a colour selection electrode disposed close to the fluorescent screen of the face plate. In such a colour picture tube, electrons emitted from the electron gun are accelerated by means of an accelerating electric field of high voltage and collide with the fluorescent screen through the colour selection electrode to brighten the fluorescent material on the fluorescent screen. Through this collision, a number of secondary electrons including reflected electrons are generated from the fluorescent screen. Almost all of the secondary electrons are not in a higher energy level compared with the reflected electrons and hence these secondary electrons are eliminated using the difference of energy level from incident electrons but the reflected electrons or the secondary electrons having about the same energy level as that of the reflected electrons again collide with the fluorescent screen with the result that the colour purity or contrast of the image is deteriorated.

As to the method of overcoming the above disadvantage, the methods according to the prior art and the present invention will now be described with reference to the accompanying drawing in which:

FIG. **1** is a vertical cross sectional view of a colour picture tube having a secondary electron preventive layer,

FIGS. **2** and **3** are enlarged sectional views of the face plate and the fluorescent screen formed thereon in the conventional colour picture tube, and

FIGS. **4** and **5** are views for explaining the embodiments of the colour picture tube according to the present invention.

Referring to FIG. **1**, a conventional colour picture tube **10** is depicted in vertical cross-section as comprising a funnel part **11** and a nect part **12.** An electron gun **13** is shown within the nect part **12** and emits electron beams **14** aimed at the fluorescent screen of the face plate **15** of the tube **10.** The secondary electron preventive layer formed in accordance with the present invention is shown labeled as **16.** Shown at **17** are the previously mentioned emitted electrons which again collide with the fluorescent screen of the face plate **17.**

There is shown in FIG. **2** a prior art in which an aluminum layer **3** is formed on a fluorescent screen **2** applied on an inner surface of a face plate **1,** a deposited layer **4** of the material of small atomic number such as carbon or boron is formed on the aluminium layer of metal back layer thereby to reduce the amount of secondary electrons. Further, there has been also proposed a method of suppressing the generation of secondary electrons in which a volatile organic film is intervened between the aluminium layer **3** and the deposited layer **4** thereby to prevent carbon or boron from being diffused into the aluminium layer **3** of metal back layer and to suppress the generation of secondary electrons. There has been also developed a method as shown in FIG. **3** in which in forming the deposited layer **4** of carbon or boron, a suspended liquid of carbon or boron particles is applied to the aluminium layer **3** to a gradient layer **5** having a concentration gradient of carbon or boron in the aluminium layer **3** of metal back layer therby to reduce the amount of secondary electrons.

According to the said various methods, the amount of secondary electrons can be reduced to some extent but it is impossible to suppress secondary electrons without deteriorating the brightness of a colour picture tube and to obtain a colour picture tube having a satisfactory contrast in practical use. Further, as shown in FIGS. **2** and **3,** since the deposited layer **4** is exposed at the electron gun side of the face plate **1,** this deposited layer may be disadvantageously removed at the heating process in the fabrication of the colour picture tube.

Accordingly, an object of the present invention is to eliminate these defects, to provide a method of fabricating a secondary electron preventive layer having an excellent secondary electron prevention characteristic without reducing the brightness which is hardly removed, and to provide a colour picture tube having the secondary electron preventive film fabricated by the method.

According to the present invention, there is provided a method of fabricating a secondary electron emission preventive film for use in a colour picture tube comprising the steps of applying a fluorescent screen on a face plate, forming a deposited layer as a metal back layer on the fluorescent screen, and spraying an aqueous suspension of either carbon or boron particles on the metal back layer on an upper portion of the metal back layer.

In the following, embodiments according to the present invention will be explained with reference to FIGS. **4** and **5.**

In FIG. **4,** after a fluorescent screen **2** is applied to the inner surface of a face plate **1,** a metal back layer such as an aluminium film **3** is found on the flourescent screen. In this case, the thickness of the metal back layer **3** may be preferably 4000 ~ 6000 A. Next, an aqueous suspension of carbon or boron particles is sprayed on this metal back layer **3** to form a layer of material **4** of small atomic number 6 and below. Incidentally, the thickness of this layer of material **4** may be about 0.03 mg/cm^2 ~ 0.12 mg/cm^2 in case the metal back layer **3** of aluminium is 4000 ~ 6000 A. Further, the face plate **1** is heated at about 400° ~ 450°C. Thus, the layer of material **4** of carbon or boron is absorbed into the metal back layer **3** and as shown in FIG. **5,** a mixed layer **6** of carbon or boron particles and the metal back layer **3** is formed with the result that a single element is not present on the upper portion of the metal back layer.

As described above, according to the present invention, since there is not a material of small atomic number such as carbon or boron as a single element on the surface of the face plate at the electron gun side, it is possible to prevent the deterioration of the brightness as well as that the layer of material of small atomic number may not be easily removed. Incidentally, in the

above embodiment, although a single element such as carbon or boron is employed as the material layer **4**, the elements of lithium or beryllium could also be so employed. Also a compound containing an element of the atomic number 6 and below, for example, boron carbide is also employed. Further, different from the case that the metal back layer is formed of only aluminium and is exposed, the emission of secondary electron from the metal back layer is suppressed by means of the mixed layer and thus the contrast of an image is remarkably improved.

What we claim is:

1. A method of fabricating a secondary electron emission preventive film for use in a colour picture tube comprising the steps of applying a fluorescent screen on a face plate, forming a deposited layer as a metal back layer on the fluorescent screen, spraying an aqueous suspension of one material from the group consisting of carbon, boron and a compound thereof onto said metal back layer, and heating the face plate to form a mixed layer of said one material and the metal back layer material on an upper portion of the metal back layer.

2. A method of fabricating a secondary electron emission preventive film for use in a colour picture tube comprising the steps of applying a fluorescent screen on a face plate; forming a deposited layer as a metal back layer on the fluorescent screen; spraying an aqueous seuspension of one material selected from the group consisting of carbon, boron, lithium, beryllium, and a compound containing an element of the atomic number 6 and below onto said metal back layer; and heating the face plate to form a mixed layer consisting of said one material and the metal back layer material on the uppermost portion of the metal back layer.

3. A method of fabricating as claimed in claim **2** in which said metal back layer is formed of aluminium.

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